PHASE ONE: BREAK DOWN
SUNLIGHT OVEN

Mission: How does the color of a material affect how much sunlight it absorbs?

Age: 8+
Materials: $8

Time: 45 min
(Set-up: 15 min | Activity: 20 min with wait time | Clean-up: 10 min)

What you need:

Materials:
- Colored paper (black, white, red, and blue)
- 1 stick of butter at room temperature (don't use margarine or butter alternatives)
- Aluminum foil
- Tape
- Large box
- Data sheet (found on PDF)

Equipment:
- A cool, indoor sunny location
- Timer
- Table knife
- Ruler
- Pen/pencil
- Scissors
- (Optional) Cell phone or video camera

What to do:

1. To build your sunlight oven, line the inside of your box with aluminum foil, using tape to attach. Find a place in your house with direct sunlight, such as near a window. Make sure that sunlight reaches the entire inside bottom of the box.

2. Cut a 3 inch (7.5 cm) square of each color of paper (black, white, red, and blue). Tape each square to the bottom of your sunlight oven.

3. With a table knife, cut a 1/8" (3 mm) thick slice of butter, then cut crosswise to make four identical smaller squares of butter.

4. Make a prediction: Which color of paper will make the butter melt the fastest? Which will be the slowest? Think about how it feels to wear a dark or light shirt on a sunny day. Use the data sheet to record the order of your predictions.

5. Time to test! Take your four pieces of butter and place one on the center of each paper square. When you are ready to start the experiment, carefully move your oven near your window so the sunlight reaches all four squares. Start a timer.

6. (Optional) Scientists often use tools to record their experiments. You can try this technique by cutting a small hole in the top of your box and positioning a cell phone camera above. You can take pictures at regular time points (like every minute), or set a time-lapse recording to do it automatically. You'll be able to watch your experiment in a flash at the end!

7. After the first 6-7 minutes, the butter should begin melting on some of the colored paper squares, forming a ring around each piece of butter. Observe and record which colors are melting from fastest to slowest on the data sheet. Repeat your observations and ranking after 10 minutes and again after 15 minutes in the sun. If a square of butter has fully melted, record the time when you saw it fully melted.

8. You can continue the experiment until all the pieces of butter have fully melted, but expect to wait another 20 minutes at least. You may have to shift the location of the box to keep all the squares in the sunlight. On what color of paper did the butter melt fastest? Slowest? Did your results match your prediction?

Clean-up:

Tip the box into a trash can and allow the melted butter to drain out. Remove the paper squares and throw them away. If you want to experiment with other colors of paper, wipe the inside of the box with a damp paper towel to remove excess butter before adding new paper.

DATA SHEET

SUNLIGHT OVEN

PAPER COLOR	PREDICTED ORDER (RANK 1-4)	OBSERVED ORDER (6 MIN)	OBSERVED ORDER (10 MIN)	OBSERVED ORDER (15 MIN)	FULLY MELTED? (YES/NO)
Black					Yes No Time: min
White					Yes No Time: min
Red					Yes No Time: min
Blue					Yes No Time: min
					Yes No Time: min
					Yes No Time: min
					Yes No Time: min
					Yes No Time: min